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(54) Title of the Design

VARIABLE RESISTOR

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Specification

1. Title of the design

Variable Resistor

2. Claims

A variable resistor comprising a resistor main body for changing the conductive resistance of electrode parts with the press deformation of covered pressed parts of an acting body made of an elastic material and an operating body having pressing parts capable of pressing the pressed parts is characterized by vertically providing shake prevention projections made of an elastic material adjacent to the pressed parts of the acting body, have a larger height dimension than the pressed parts and their upper ends contacting the pressing parts of the operating body.

3. Detailed description of the design

(Field of industrial application)

The present design relates to a modification of a variable resistor for changing the conductive resistance of electrode parts with the press deformation of pressed parts via an operating body, and relates particularly to a variable resistor that may prevent shaking of the operating body.

(Prior art)

A variable resistor shown in Fig. 4 has been known as this kind of variable resistor before.

This variable resistor is a seesaw type resistor having two electrodes and is constituted from a resistor main body 20 and an operating body 30 for the press operation.

The resistor main body 20 comprises an acting body 21 receiving the press operation, a pressure plate 22 and a base board 23.

The acting body 21 is formed of an elastic material such as synthetic rubber, etc. in the shape of a rectangular plate and has two hill-like pressed parts 21a on its upside. The upper ends of the two hill-like pressed parts 21a are flat and have projections 21a1 for preventing shaking of the operating body 30 at the center of its upside. Disc-like conductive parts 21b made of a con-

ductive rubber, etc. are coaxially attached downside of acting body 21 corresponding to the projections 21a1.

The pressure plate 22 covers the upside of acting body 21, has holes 22a for inserting the pressed parts 21a on it and has pressing surface 22b in contact with the rim upside of acting body 21 on the inner side. Multiple stop pins 22c longer than the thickness of base board 23 are formed downside of pressure plate 22.

The base board 23 comprises a printed wiring board, etc. and has electrode parts 23a capable of making contact with the conductive parts 21b of acting body 21 at two locations. Electrode parts attached to pressure-sensing conductive material, such as pressure-sensing conductive rubber, etc. upside of a pair of electrodes are used as these electrode parts 23a. Stop holes 23b capable of inserting stop pins 22c of pressure plate 22 are formed on the base board 23.

The resistor body 20 is assembled by mounting the acting body 21 on the base board 23, inserting the stop pins 22c of pressure plate 22 into the stop holes 23b of base board 23 so as to cover the acting body 21, melting or collapsing the projections of the stop pins 22c protruding downside of base board 23 to secure the pressure plate 22 to the base board 23. In this assembled state, the acting body 21 is fixedly held between the pressure plate 22 and the base board 23, bringing the conductive parts 21b of acting body 21 and the electrode parts 23a of base board 23 into contact.

On the other hand, the operating body 30 is rotatably pivoted on a shaft 31 provided in the central lower part above the resistor main body 20 by a bracket omitted in the graphical presentation. The operating body 30 has pressing parts 32 corresponding to the downside pressed parts 21a of acting body 21, and the projections 21a1 for shake prevention upside of pressed parts 21a are in contact with the pressing parts 32 in the non-pressed state, respectively.

In the variable resistor thus constituted, when the pressed parts 21a of acting body 21 are pressed downward and deformed by tilting with the shaft 31 of operating body 30 as the center, the conductive resistance of electrode parts 23a changes with the pressure force.

(Problem overcome by the design)

In the prior variable resistor, gaps formed between the pressing parts 32 and the pressed parts 21a of acting body 21 are absorbed by the projections 21a1 for shake prevention in the state of mounting the operating body 30, but the projections 21a1 are formed on the upside (pressed side) of

pressed parts 21a, therefore, if a plus-side error in height dimension of the projection themselves exists, there the problem that the pressed parts 21a receive an improper press force in the non-pressed state, and an anticipated resistance change is not obtained in the variable resistor. Similarly, if a minus-side error in the height dimension of the projection exists, there is the problem that gaps are formed and shaking is generated in the operating body 30.

The present design was made in view of the above problem, and its purpose is to provide a variable resistor that can reliably prevent shaking in the operating body 30 without causing a hindrance in the characteristic resistance value of the variable resistor.

(Problem resolution means)

To achieve the above purpose, the present design is a variable resistor which comprises a resistor main body for changing the conductive resistance of electrode parts with the press deformation of the pressed parts of an acting body made of an elastic material and an operating body having pressing parts capable of pressing the pressed parts and is characterized by vertically providing projections for shake prevention made of an elastic material adjacent to the pressed parts of the acting body, have a larger height dimension than the pressed parts and have their upper ends in contact with the pressing parts of the operating body.

(Functions)

According to the present design, the projections for shake prevention which have a larger height dimension than the pressed parts and their upper ends are in contact with the pressing part of the operating body are vertically provided in positions different from the pressed parts, therefore an improper pressure force is not applied to the extruded parts even if a large height dimension of the projections is formed by considering the minus-side error portion.

(Example)

Fig. 1 to Fig. 3 show an example in which the present design is applied to a seesaw type variable resistor, Fig. 1 is the sectional view of the variable resistor, Fig. 2 is the top view of a resistor main body, and Fig. 3 is the illustrative drawing of operations.

The variable resistor of this example shown in Fig. 1 and Fig. 2 is constructed from a resistor main body 1 and an operating body 10 for press operations.

The resistor main body 1 comprises an acting body 2 receiving the press operation , a pressure plate 3 and a base board 4.

The acting body 2 is formed of an elastic material such as synthetic rubber, etc. in the shape of a rectangular plate and has two hill-like pressed parts 2a with flat upper ends on its upside. Conical conductive parts 2b made of a conductive rubber, etc. are coaxially attached downside of acting body corresponding to the projections 2c (wrong number "2a"?, translator). Rod-like projections 2c for shake prevention which are adjacent to the pressed parts 2a and have a larger height dimension than the pressed parts 2a are provided vertically and integrally with the acting body 2, respectively.

The pressure plate 3 covers the upside of acting body 2, has roughly circular holes 3a, through which the pressed parts 2a and the rod-like projections 2c are inserted on the upside and have the pressing surface 3b in contact with the upside of acting body 2 on the inner side. Engagement pieces 3c which are longer than the thickness of base board 4 and have a hooklike engagement at the lower end are vertically provided at each side of the pressure plate 3.

The base board comprises a printed wiring board, etc. and has electrode parts 4a for which the conductive parts 2b of acting body 2 is contactable at two locations on its upside. Electrode parts in which two semi-circular resistance films are arranged in the non-contact state and electrodes are connected to the resistance films are used as the electrode parts 4a. Engagement holes 4b through which the engagement pieces 3c of pressure plate 3 can be inserted and engaged are formed corresponding to the engagement pieces.

This resistor main body 1 is simply assembled by mounting the acting body 2 on the base board 4, inserting the engagement pieces 3c of pressure plate 3 into the engagement holes 4b of base board 4 and stopping them so as to cover the acting body 2. In the assembled state, the acting body 2 is fixedly held between the pressure plate 3 and the base board 4, and the conductive parts 2b of acting body 2 and the electrode parts 4a of base board 4 are opposite at a prescribed spacing.

On the other hand, in the operating body 10 is rotatably pivoted above the resistor main body 1 on a shaft 11 provided in the central lower part by a bracket omitted in the graphical presentation. The operating body 10 has rectangular pressing parts 12 corresponding to the pressed parts 2a of acting body 2, respectively, the upper ends of the rod-like projections 2c for shake prevention are in contact with the pressing parts 12 in the non-extruded state, respectively.

Operations of the above-mentioned variable resistor are described next with reference to Fig. 3.

In Fig. 3, if the top left side of the operating body 10 is pressed with a finger tip, etc., the operating body 10 is tilted in the counterclockwise direction with the shaft 11 as center, first the rod-like projections 2c for shake prevention in contact with the left-side pressing part 12 flex, shortly the pressing part 12 makes contact upside of the pressed part 2a, the pressed part 2a is pressed down and deformed, and the conductive parts 2b on the downside of pressed parts 2a makes contact with the electrode parts 4a. The contact area of the conductive parts 2b increases with the pressure force, changing the conducting resistance of electrode parts 23a.

If the pressing onto the operating body 10 is released, the pressed parts 2a of acting body 2 and the rod-like projections 2c for shake prevention are restored to the original state by their own elasticity, respectively, and the downside of operating body 10 is supported by the rod-like projections 2c again to prevent shaking.

Thus, in the above-mentioned variable resistor, the rod-like projections 2c for shake prevention adjacent to the pressed parts 2a and have a larger height dimension than the pressed parts 2a are vertically provided upside of acting body 2 and their upper ends make contact with the pressing parts 12 of operating body 10. Therefore, even when a plus-side error in height dimension of the rod-like projections 2c for shake prevention is generated, the rod-like projections 2c flex more or less, and improper press force is not applied to the pressing parts 12 in the non-pressed state, thereby obtaining anticipated resistance change in the variable resistor, making it possible to form a large height dimension of the rod-like projections 2c for shaking prevention beforehand by considering a minus-side error portion, accurately bringing the upper ends of the rod-like projections 2c into contact with the pressing parts 12 of operating body 10 to reliably prevent shaking of operating body 10.

The case of applying the present design to the seesaw type variable resistor was shown in the above example. However, the present design may also be applied in other types of variable resistors with one, three or more pressed parts. Moreover, electrode parts using a resistance film were shown as the electrode parts 4a, but electrode parts using a pressure-sensing conductive material the same as

in the prior example may also be used. Furthermore, the case of forming the projections for shake prevention in the shape of rod was shown, but various shapes of projections may be adopted if the projections are in contact with the pressing parts and may prevent the shaking.

(Efficacy of the design)

As described in detail above, according to the present design, the projections for shake prevention flex more or less and an improper press force is not applied to the pressing parts of the acting body in the non-pressed state, thereby obtaining anticipated resistance change in the variable resistor even if a plus-side error in the height dimension of projections is generated. Moreover, it becomes possible to form a large height dimension of projections beforehand by considering a minus-side error, therefore the upper ends of the projections may be accurately brought into contact with the pressing parts of operating body to reliably prevent shaking of the operating body.

4. Brief description of the drawings

Fig. 1 to Fig. 3 show an example of applying the present design to a seesaw type variable resistor. Fig. 1 is the sectional view of the variable resistor, Fig. 2 is a top view of a resistor main body, Fig. 3 is the illustrative drawing of operations, and Fig. 4 is the sectional view of the prior variable resistor.

In the drawings,

- 1 resistor main body
- 2 acting body
- 2a pressed body
- 2c rod-like projection for shake prevention
- 4a electrode part
- 10 operating body
- 12 pressing part

- 1 resistor main body
- 2 acting body
- 2a pressed body
- 2c rod-like projection for shake prevention
- 4a electrode part
- 10 operating body
- 12 pressing part

Sectional view of variable resistor

[Fig. 1]

Top view of resistor main body

[Fig. 2]

- 1 resistor main body
- 2 acting body
- 2a pressed body
- 2c rod-like projection for shake prevention

- 4a electrode part
- 10 operating body
- 12 pressing part

Illustrative drawing of operations

[Fig. 3]

- 20 resistor main body
- 21 acting body
- 21a pressed body
- 21a1 projection
- 23a electrode part
- 30 operating body
- 32 pressing part

Sectional view of prior variable resistor

[Fig. 4]

CERTIFICATE OF TRANSLATION

I Roger P. Lewis, whose address is 42 Bird Street North, Martinsburg WV 25405, declare and state the following:

I am well acquainted with the English and Japanese languages and have in the past translated numerous English/Japanese documents of legal and/or technical content.

I hereby certify that the Japanese translation of the attached translation of documents identified as:

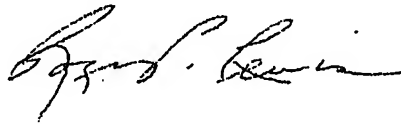
Utility Model Application

H3-61304

"Variable Resistor"

is to the best of my knowledge and ability true and accurate.

I further declare that all statements contained herein of our own knowledge, are true, that all statements of information and belief are believed to be true.



ROGER P. LEWIS

October 24, 2006

AL MINISTERO DELL'INDUSTRIA DEL COMMERCIO E DELL'ARTIGIANATO
UFFICIO CENTRALE BREVETTI - ROMA
DOMANDA DI BREVETTO PER INVENZIONE INDUSTRIALE, DEPOSITO RISERVA ANTICIPATA



A. RICHIEDENTE (1)

1) Denominazione | ZUKIN MARCIO
Residenza | MILANO VIA POPOLI UNITI 20
2) Denominazione | RANZANI PAOLO CARLO
Residenza | MILANO VIA FORNARI 10

B. RAPPRESENTANTE DEL RICHIEDENTE PRESSO L'U.C.B.

Cognome nome | //
Denominazione studio di appartenenza | //
Via | // Città | // Cap | (prov) | //

C. DOMICILIO ELETTIVO DESTINATARIO | RANZANI PAOLO CARLO C/O F.LLI RANZANI
Via | SALVO D'ACQUISTO Città | SIZIANO Cap | 27010 (prov) | PV

D. TITOLO | classe preposta (ser/cl/sd) | // gruppo/sottogruppo | //
TASTIERA A RETROAZIONE TATTILE A VIBRAZIONE

ANTICIPATA ACCESSIBILITÀ AL PUBBLICO: ☐ SÌ ☒ NO SE ISTANZA: DATA // // // N° PROTOCOLLO // //

E. INVENTORI DESIGNATI
1) ZUKIN MARCIO
2) RANZANI PAOLO CARLO

F. PRIORITÀ

Denominazione o organizzazione	Tipo di priorità	Numero di domanda	Data di deposito	Allegato S/R	SCIoglimento RISERVE Data N° Protocollo
1)					
2)					

G. CENTRO ABILITATO DI RACCOLTA COLTURE DI MICROORGANISMI, denominazione
|

H. ANNOTAZIONI SPECIALI
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DOCUMENTAZIONE ALLEGATA
N. es.

Doc.	Descrizione	Allegato S/R	SCIoglimento RISERVE Data N° Protocollo
Doc. 1) 1 (prov) a pag 108	riassunto con disegno principale, descrizione e rivendicazioni (obbligatorio 1 esemplare)		
Doc. 2) 0 (prov) a tav 1	disegno (obbligatorio se citato in descrizione, 1 esemplare)		
Doc. 3) 0 (rs)	lettera d'incarico, procura o riferimento procura generale		
Doc. 4) 0 (rs)	designazione invenzione		
Doc. 5) 0 (rs)	documenti di priorità con traduzione in italiano		
Doc. 6) 0 (rs)	autorizzazione o atto di cessione		
Doc. 7) 0	nominativo completo del richiedente		

8) attestato di versamento totale lire | 159.000 (centocinquantanovemila) | obbligatorio
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UFFICIO PROVINCIALE IND. COMM. ART. DI | MILANO | codice | 05
VERBALE DI DEPOSITO | NUMERO DI DOMANDA | MI 91 A 00 3315 | Reg. A
L'anno millenovocento | Novantuno | il giorno | Undici | del mese di | Dicembre |
Il(1) richiedente(1) soprindicato(1) ha(hanno) presentato a me sottoscritto la presente domanda, corredata di n. | 00 | fogli aggiuntivi per la concessione del brevetto soprariportato.

I. ANNOTAZIONI VARIE DELL'UFFICIALE ROGANTE
|
IL DEPOSITANTE
Luigi Zukin
L'UFFICIALE ROGANTE
Potenghi A.

PROSPETTO A

RIASSUNTO INVENZIONE CON DISEGNO PRINCIPALE, DESCRIZIONE E RIVENDICAZIONE

NUMERO DOMANDA L. 101.91 A. 003315

REG. B

DATA DI DEPOSITO 00/00/0000

NUMERO BREVETTO L.

DATA DI RILASCIO 00/00/0000

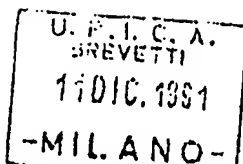
D. TITOLO

L. TASTIERA A RETROAZIONE TATTILE A VIBRAZIONE
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L. RIASSUNTO

Tastiera di comando per apparecchiature elettriche od elettroniche in cui la retroazione dell'avvenuto comando viene inoltrata all'operatore mediante vibrazione del tasto stesso.

M. DISEGNO



MI 91 A/033 15

Marcio Zukin

DESCRIZIONE DI INVENZIONE INDUSTRIALE

Descrizione dell'INVENZIONE INDUSTRIALE dal
titolo: "TASTIERA A RETROAZIONE TATTILE A
VIBRAZIONE" a nome dei Sigg.

Zukin Marcio nato a Rio De Janeiro -Brasile- il
01/03/1966 residente a Milano in via Popoli Uniti
20

Ranzani Paolo nato a Milano il 13/10/1963
residente a Milano in via Fornari 10

RIASSUNTO

Tastiera di comando per apparecchiature
elettriche/elettroniche in cui la retroazione
dell'avvenuto comando, viene inoltrata
all'operatore mediante vibrazione del tasto
stesso.

STATO ATTUALE DELLA TECNICA

Sono note le tastiere o pulsantiere di comando che
quotidianamente vengono azionate nelle piu'
diversificate applicazioni: calcolatrici,
telefoni, ascensori, distributori automatici,
elettrodomestici etc.

Le attuali tastiere presentano tipologie
costruttive variabili anche in funzione della
applicazione; si hanno pertanto tastiere a

Luca Zulueta

microinterruttori, a membrana, capacitive etc.

Elemento essenziale dell'apparecchiatura e' un contatto, meccanico od elettronico, che viene chiuso, ovvero messo in conduzione, quando il tasto viene premuto dall'operatore.

L'informazione che il tasto e' stato effettivamente premuto puo' pervenire all'operatore in diversi modi: rumore meccanico del tasto, segnalazione acustica, segnalazione luminosa, innesco delle operazioni comandate dal tasto, etc.

In applicazioni di largo consumo od in ambienti industriali particolarmente ostili, si preferisce utilizzare tastiere a membrana o capacitive per la loro maggiore resistenza meccanica ed alla penetrazione di agenti esterni come polvere, umidita', trucioli di lavorazione.

Tali tastiere non danno una retroazione "meccanica" a causa della loro tecnologia costruttiva, si deve pertanto ricorrere alla segnalazione acustica o luminosa.

Nel caso in cui l'operatore sia non udente o non vedente o comunque si trovi in ambienti rumorosi o malamente illuminati, egli non puo' definire con

certezza l'avvenuto comando.

Manfred Zin

Il ritrovato in oggetto elimina o riduce i suddetti inconvenienti risolvendo anche completamente alcuni problemi come qui di seguito illustrato.

DESCRIZIONE DEL RITROVATO

Secondo il ritrovato si prevede una risposta all'operatore mediante la vibrazione del tasto premuto.

La retroazione agisce pertanto sul tatto dell'operatore, lasciando liberi, se efficienti, gli altri sensi.

Secondo una struttura preferenziale, il ritrovato si presenta come una normale tastiera a membrana sotto alla quale vengono applicati dei trasduttori piezoelettrici, che, eccitati ad una opportuna frequenza, mettono in vibrazione il tasto stesso.

In una variante si prevede che lo stesso trasduttore piezoelettrico funzioni contemporaneamente anche da tasto, in quanto esso genera una tensione proporzionale alla sollecitazione meccanica applicata.

Allo scopo di rendere idoneo il ritrovato anche ad applicazioni già esistenti, il trasduttore

Manuel Zulu

potrebbe essere posizionato anche sul lato anteriore del tasto.

VANTAGGI

Sono evidenti i vantaggi del ritrovato.

Con una tastiera avente aspetto esteriore uguale a quello dei modelli esistenti, si allarga la possibilita' di uso di certe apparecchiature anche a persone handicappate o l'uso di apparecchiature in ambienti particolarmente ostili.

All'operatore non viene richiesta nessuna attenzione particolare e l'uso del ritrovato non presenta complicazioni aggiunte.

Ovviamente sono innumerevoli le varianti possibili.

Ad esempio al posto di un trasduttore piezoelettrico se ne puo' usare uno di tipo magnetodinamico, o di tipo magnetostrittivo.

Pertanto deve essere inteso che nella domanda di privativa sia compresa ogni equivalente applicazione dei concetti ed ogni equivalente prodotto attuato e/o operante secondo una o piu' qualsiasi delle caratteristiche indicate nelle seguenti:

RIVENDICAZIONI

Manuf. Zin

1) Tastiera a retroazione caratterizzata da cio' che la retroazione viene inviata all'operatore mediante azione vibratoria del tasto stesso.

2) Tastiera a retroazione come alla rivendicazione 1), caratterizzata da cio' che la vibrazione inizia dopo che il tasto e' stato effettivamente premuto.

3) Tastiera a retroazione come alle rivendicazioni 1) e 2), caratterizzata da cio' che la vibrazione viene generata da un trasduttore piezoelettrico.

4) Tastiera a retroazione come alle rivendicazioni da 1) a 3), caratterizzata da cio' che il trasduttore piezoelettrico viene pilotato da un circuito elettronico.

5) Tastiera a retroazione come alle rivendicazioni da 1) a 4), caratterizzata da cio' che la tastiera ha forme usuali e pertanto e' di uso istintivo.

6) Tastiera a retroazione come alle rivendicazioni da 1) a 5), caratterizzata da cio' che il trasduttore puo' essere anche di tipo differente.

7) Tastiera a retroazione come alle rivendicazioni da 1) a 6), caratterizzata da cio' che il trasduttore puo' essere posizionato anche sulla faccia anteriore della tastiera.

8) Tastiera a retroazione come alle rivendicazioni da 1) a 7), caratterizzata da cio' che il

Francesco Zucchi

trasduttore stesso puo' fungere da tastiera.

9) Tastiera a retroazione come alle rivendicazioni da 1) a 8); caratterizzata da cio'che l'innesco della vibrazione puo' essere determinato dalla effettiva attuazione della operazione legata alla pressione del tasto.

10) Tastiera a retroazione come alle rivendicazioni da 1) a 9), caratterizzata da cio'che la frequenza di vibrazione del tasto puo' essere differenziata per indicare diversi tipi di azione.

11) Tastiera a retroazione come alle rivendicazioni da 1) a 10), caratterizzata da cio'che il trasduttore sia applicato alla tastiera mediante incollaggio od altro mezzo.

12) Tastiera a retroazione come alle rivendicazioni da 1) a 11), caratterizzata da cio'che il circuito elettronico di pilotaggio del trasduttore sia montato su una scheda separata.

13) Tastiera a retroazione come alle rivendicazioni da 1) a 12), caratterizzata da cio'che il circuito elettronico di pilotaggio venga integrato nel trasduttore stesso.

14) Tastiera a retroazione come alle

Manuscript

rivendicazioni da 1) a 13), caratterizzata da
cio' che il sistema possa essere applicato anche su
tastiere preesistenti.

Il tutto sostanzialmente come descritto ed
illustrato e per gli scopi specificati.

Manuscript



DESCRIPTION OF AN INDUSTRIAL INVENTION

Description of the INDUSTRIAL INVENTION having the title: "KEYBOARD WITH VIBRATING TACTILE FEEDBACK" to

Mr Zukin Marcio born in Rio De Janeiro – Brazil – on 01/03/1966 resident in Milan at via Popoli Uniti 20

Mr Ranzani Paolo born in Milan on 13/10/1963 resident in Milan at via Fornari 10

ABSTRACT

Command keyboard for electrical/electronic apparatuses in which the feedback of a command that has occurred is transmitted to the operator through vibration of the button itself.

BACKGROUND OF THE INVENTION

Keyboards or keypads are known that are actuated daily in the most different applications: calculators, telephones, lifts, cash machines, domestic appliances, etc.

Current keyboards have variable embodiments also according to the application; therefore there are microswitch, membrane, capacitive keyboards, etc.

An essential element of the apparatus is a contact, mechanical or electronic, which is closed, i.e. made to conduct, when the button is pressed by the operator.

The operator can be informed that the button has actually been pressed in different ways: mechanical noise of the button, acoustic signal, light signal, triggering of the operations commanded by the button, etc.

In widely used applications or in particularly hostile industrial environments, it is preferred to use membrane or capacitive keyboards due to their greater mechanical strength and the penetration of impurities like dust, humidity and processing chips.

Such keyboards do not give "mechanical" feedback due to their constructive technology and therefore acoustic or light signals must be used.

In the case in which the operator is deaf or blind or in any case is in noisy or poorly lit environments, he cannot be certain of whether a command has occurred.

The invention in object eliminates or reduces the aforementioned drawbacks also completely solving some problems as illustrated hereafter.

DESCRIPTION OF THE INVENTION

According to the invention, a response to the operator through the vibration of the pressed button is foreseen.

The feedback therefore acts on the operator's sense of touch, leaving the other senses free, if they work.

According to a preferential structure, the invention is in the form of a normal membrane keyboard under which piezoelectric transducers are applied that, excited at a suitable frequency, make the button itself vibrate.

In a variant it is foreseen for the same piezoelectric transducer to simultaneously operate as a button, since it generates a voltage proportional to the mechanical stress applied.

In order to make the invention also suitable for applications that already exist, the transducer could also be positioned on the front side of the button.

ADVANTAGES

The advantages of the invention are clear.

With a keyboard having the same appearance as existing models, the possibility of using certain apparatuses is extended to handicapped people or it becomes possible to use apparatuses in particularly hostile environments.

The operator does not have to pay any special attention and the use of the invention has no additional complications.

Obviously, the possible variants are numerous. For example, instead of a piezoelectric transducer, a magnetodynamic or magnetostrictive transducer can be used.

Therefore, it should be understood that the patent application covers any equivalent application of the concepts and any equivalent product made and/or operating according to any one or more of the characteristics indicated in the following:

CLAIMS

- 1) Keyboard with feedback characterized in that the feedback is sent to the operator through vibration of the button itself.
- 2) Keyboard with feedback according to claim 1), characterized in that the vibration begins after the button has actually been pressed.
- 3) Keyboard with feedback according to claims 1) and 2), characterized in that the vibration is generated by a piezoelectric transducer.
- 4) Keyboard with feedback according to claims 1) to 3), characterized in that the piezoelectric transducer is controlled by an electronic circuit.
- 5) Keyboard with feedback according to claims 1) to 4), characterized in that the keyboard is the normal shape and is therefore instinctive to use.
- 6) Keyboard with feedback according to claims 1) to 5), characterized in that the transducer can also be of a different type.
- 7) Keyboard with feedback according to claims 1) to 6), characterized in that the transducer can also be positioned on the front face of the keyboard.
- 8) Keyboard with feedback according to claims 1) to 7), characterized in that the transducer itself can act as a keyboard.
- 9) Keyboard with feedback according to claims 1) to 8), characterized in that the triggering of the vibration can be brought about by the actual actuation of the operation linked to the pressing of the button.
- 10) Keyboard with feedback according to claims 1) to 9), characterized in that the frequency of vibration of the button can be differentiated to indicate different types of action.
- 11) Keyboard with feedback according to claims 1) to 10), characterized in that the transducer is applied to the keyboard through gluing or another means.

12) Keyboard with feedback according to claims 1) to 11), characterized in that the electronic control circuit of the transducer is mounted on a separate board.

13) Keyboard with feedback according to claims 1) to 12), characterized in that the electronic control circuit is integrated in the transducer itself.

14) Keyboard with feedback according to claims 1) to 13), characterized in that the system can also be applied onto pre-existing keyboards.

All as substantially described and illustrated and for the specified purposes.